Analytical and Simulation Framework for Performance Validation of Complex Systems, Phase II

Completed Technology Project (2004 - 2006)

Project Introduction

Next-generation aerospace systems will require increased autonomy to modify system behavior based on changing mission requirements, environmental factors, and system performance. For example, intelligent systems have been employed to improve safety by adaptively compensating for unexpected failures or damage. Despite many successful demonstrations of autonomous and intelligent control laws in simulations and flight tests, the difficulty associated with the verification, validation, and testing of adaptive and nondeterministic systems poses a significant barrier to their use in safety-critical systems. The proposed Phase II research addresses this challenge through the development of innovative V\\&V algorithms and easy-to-use software tools that will provide intelligent, automated, and interactive test plan generation and execution. The tool will integrate state-of-the-art analysis and numerical methods to automatically generate test vector sets, execute high-fidelity simulations or monitor pilot-in-the-loop simulations, analyze simulation results, and adapt/modify future test vectors based on observations to date. The result will be a significant reduction in cost associated with system testing while simultaneously offering a significant increase in the probability that system problems are uncovered early in the development process. The tool will have broad applicability for aerospace as well as non-aerospace applications.

Primary U.S. Work Locations and Key Partners
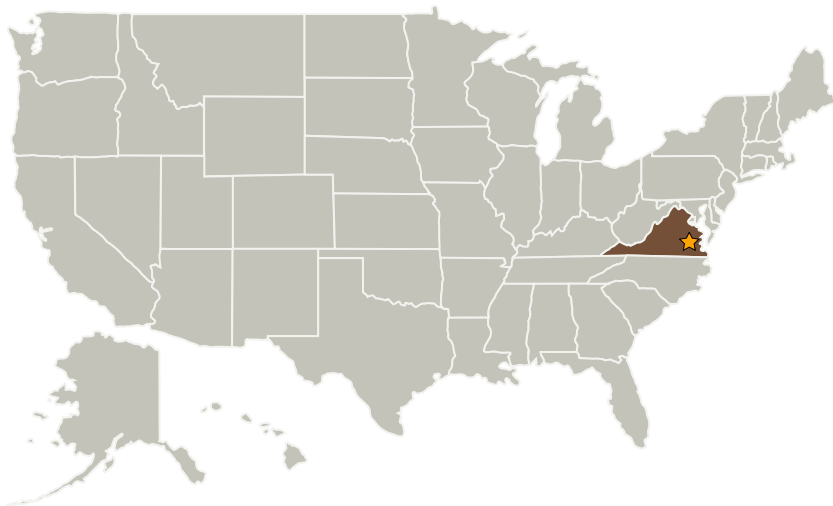
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Organizations Performing Work	Role	Type	Location
⭐Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Barron Associates, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations
Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  └ TX15.2 Flight Mechanics
    └ TX15.2.2 Flight Performance and Analysis